

**This is an electronic reprint of the original article.
This reprint *may differ* from the original in pagination and typographic detail.**

Author(s): Haapala, Henna; Hirvensalo, Mirja; Laine, K.; Laakso, Lauri; Hakonen, H.; Lintunen, Taru; Tammelin, T. H.

Title: Differences in physical activity at recess and school-related social factors in four Finnish lower secondary schools

Year: 2017

Version:

Please cite the original version:

Haapala, H., Hirvensalo, M., Laine, K., Laakso, L., Hakonen, H., Lintunen, T., & Tammelin, T. H. (2017). Differences in physical activity at recess and school-related social factors in four Finnish lower secondary schools. *Health Education Research*, 32(6), 499-512. <https://doi.org/10.1093/her/cyx069>

All material supplied via JYX is protected by copyright and other intellectual property rights, and duplication or sale of all or part of any of the repository collections is not permitted, except that material may be duplicated by you for your research use or educational purposes in electronic or print form. You must obtain permission for any other use. Electronic or print copies may not be offered, whether for sale or otherwise to anyone who is not an authorised user.

Differences in physical activity at recess and school-related social factors in four Finnish lower secondary schools

H. L. Haapala^{1,2*}, M. H. Hirvensalo², K. Laine¹, L. Laakso², H. Hakonen¹,
T. Lintunen² and T. H. Tammelin¹

¹LIKES Research Centre for Physical Activity and Health, 40700 Jyväskylä, Finland and ²Faculty of Sport and Health Sciences, University of Jyväskylä, 40600 Jyväskylä, Finland

*Correspondence to: H. L. Haapala. E-mail: henna.haapala@likes.fi

Received on December 22, 2016; editorial decision on September 20, 2017; accepted on October 19, 2017

Abstract

This study investigated the differences in physical activity (PA) at recess and school-related social factors, and described school PA promotion processes and staff experiences at four lower secondary schools from the Finnish Schools on the Move programme. Recess PA, peer relationships at school, relatedness to school, and school climate were assessed via surveys with eighth-grade students in spring 2011 ($n = 385$) and spring 2013 ($n = 373$). Local contact people in the school projects ($n = 6$), school staff ($n = 83$) and principals ($n = 3$) provided information on the PA promotion process via telephone interviews and surveys. Differences in student-level data in years 2011 and 2013 were analysed by gender using two-way ANOVA. Data on school processes were analysed using a combination of classification, narrative approach and content analysis.

In two of the four schools, male students reported higher levels of recess PA in 2013 compared to 2011. In three schools, school-related social factors did not differ between 2011 and 2013. School cultures and routes towards a more physically active school day differed; the project was highly visible in all schools, but staff participation varied. More research is needed to determine the effective physically active strategies to promote positive social well-being and to enhance staff engagement.

Introduction

Physical activity (PA) during adolescence is associated with improved cardiovascular health [1], academic performance [2] and mental health [3]. However, only 13% of females and 22% of males aged 15 years in Finland reach the recommended 60 min of daily MVPA [4]. Young people tend to become less physically active and more sedentary during the transition from childhood to adolescence [5, 6] and from primary to lower secondary school [7].

School represents an ideal setting for PA promotion because it reaches the majority of children in each age group and students spend most of their waking hours in school [8, 9]. School recess (break times) in particular is one of the key opportunities for students to be physically active in the school environment, aside from physical education lessons [10, 11]. For example, in 10-to-12-year-old children recess can contribute up to 40% of the recommended daily PA [12, 13]. Nevertheless, most interventions promoting PA during school hours have involved primary school children, and knowledge on effective interventions and promising efforts among adolescents is limited [14].

A recent Health Behaviour in School-aged Children (HBSC) study reported that, among 15 year olds, only 13% females and 9% of males in Finland like school a lot, and 65% of Finnish

females and 54% of males feel pressured by school-work some or a lot [4]. To make a positive contribution to this situation, a national action programme called Finnish Schools on the Move has set its aim to create a more active and pleasant school day through PA in Finnish comprehensive schools [15]. Research findings from the programme's pilot phase in 2010–2012 showed that the proportion of lower secondary school students who took part in physically active play and ball games during recess increased; however, the increase was observed mostly amongst the males [15]. Accordingly, previous studies have reported that female students have lower PA levels at recess than males [16, 17], and therefore, gender differences should be investigated in studies on recess. Furthermore, participation in physical activities during recess has been positively associated with students' school-related social factors, such as peer relationships at school, relatedness to school and school climate [18]. Other studies have also linked school-related social factors to adolescent well-being; a positive school climate has been associated with higher academic performance [19] and better psychological and behavioural adjustment [20], and higher school connectedness has been linked to fewer depressive symptoms in adolescents [21].

Successful PA promotion in schools requires consideration at multiple levels, and the social-ecological model suggests developing interventions in individual, social, environmental and policy domains [22]. Furthermore, the whole-school approach considers all segments of the school day as PA opportunities also incorporating of physical and human resources [23]. For example, a recently developed multi-component approach called Comprehensive School Physical Activity Program (CSPAP) guides schools to provide students with opportunities to accumulate the recommended 60 min of daily PA through high-quality physical education, PA before, during and after school hours, staff involvement, and family and community engagement [24]. Therefore, a physically active school culture maximizes the possibilities and resources to be physically active throughout the

school day, including the norms and values of the school.

The Finnish Schools on the Move programme adopts a bottom-up approach that gives schools and municipalities the autonomy to implement PA promotion actions considered to best fit each school's individual situation [15, 25]. Specific actions are not required, but support and ideas to make the school day more physically active and less sedentary are provided within the national network, seminars, programme website and through co-operation with experienced mentors. In order to have a more in-depth understanding of the school promotion processes, a mixed method approach combining both quantitative and qualitative data was used in this study [26]. In addition, the study design sought to examine how PA promotion actions, PA levels and school-related social factors had been retained in the individual school's culture and practices one year after the programme's pilot phase.

The aims of this study were to investigate the differences in PA at recess and school-related social factors by gender among eighth-grade students during and after the pilot phase of the Finnish Schools on the Move programme in 2011 and 2013 at four lower secondary schools, and to describe the school PA promotion processes and staff experiences.

Materials and methods

This mixed method study used both quantitative data from student surveys and qualitative data on school processes provided by principals, school staff and local contact people. Data were collected as part of the evaluation of the national Finnish Schools on the Move action programme. The programme and its design have been described in detail earlier [15]. In brief, the aim of the programme is to establish a physically active culture in Finnish comprehensive schools with the schools implementing their own individual action plans [15]. Four lower secondary schools that took part in the programme's pilot phase and obtained additional funding from autumn 2010 to spring 2012 (two academic years)

were selected for participation in the study by a researcher panel with the following selection criteria: high response rates in the student surveys, variety in school size and geographical location, and promising action plans.

Study school descriptions

The individual promotion strategies implemented by the study schools have been presented in detail elsewhere [15]. Brief descriptions of each study school are presented here.

In school A, organised recess activities and gender-specific physical activities and facilities were available. This school also implemented physically active morning openings and physically active homework. A project worker was also hired to support PA promotion along with the staff.

In school B, the planning and implementation of new promotion actions was the responsibility of one teacher. Longer recess periods with organised physical activities were introduced, and students were also instructed by their peers (recess activators).

In school C, longer recess periods and gender-specific PA opportunities during recess were implemented. Two daily outdoor recesses were introduced in the first year, and this changed to one outdoor recess in the second year. The school also had a number of staff members involved in a working group for PA promotion, and they developed networks with parents and the municipality office-holders.

In school D, organised physical activities at recess were introduced within the usual recess periods and physical break activities were implemented during lessons. Students also created a school PA working group in addition to teaching about PA and acting as recess activators.

In the Finnish school system, the length of recesses and lunch breaks are not regulated by national law. Thus, in practice students in Finland are provided with several recess periods daily, and schools arrange lessons and break times relatively independently. In lower secondary school (grades 7–9), there are usually two to four recess periods of 10–15 min after each 45–90-min lesson and one

longer recess period of 30 min for school lunch and other activities. Recess time varied between 85 and 90 min per school day in the study schools [15].

Student-level data: participants and measures

The student-level data were collected from eighth-graders from each school in spring 2011 (T1) and in spring 2013 (T2) (Table I). The students (mean age 14.9 ± 0.4 years at T1) participated voluntarily and during their regular school day they completed anonymous self-report on line surveys, which measured the study variables and demographic items. Researchers administered the survey completion, monitored understanding and answered any questions. Survey data were gathered from 385 participants (males: 52%) at T1 and from 373 respondents (males: 50%) at T2. The response rates varied between 74% and 94% in schools A, B, C and D (Table I).

PA at recess was measured with the following question ‘What do you usually do at school recess?’ This was followed by five statements: ‘I sit’, ‘I stand around’, ‘I walk’, ‘I take part in physically active play’, and ‘I play ball games, for example football’. Students responded on a four-point scale (0 = never; 1 = sometimes; 2 = at most recesses; 3 = at all recesses). To create a new variable, ‘PA at recess’, the items of sitting and standing were reverse coded, and the items in this measure were averaged (range 0–3). The internal reliability (Cronbach’s α) for this new measure has been found to be acceptable ($\alpha = 0.62$) [18]. The validity of the self-reported combined PA at recess measure has previously been evaluated in comparison with objectively measured school day PA (accelerometers). Pearson’s correlation coefficients for objectively measured sedentary time were -0.57, for light PA 0.55, and for MVPA 0.59, and all correlations were significant at the 0.01 level [18].

Peer relationships at school were measured with a subscale of the social relationships domain from the School Well-being Profile developed according to the School Well-being Model [27–29]. The subscale included eight statements: ‘Pupils in my class

Table I. Basic characteristics of the schools A, B, C and D and the number of respondents and response rates (%) in the student and staff surveys

	School			
	A Semi-urban	B Rural	C Semi-urban	D Urban
Urbanity				
School size in spring 2012, <i>n</i> for students	619 (grades 1–9)	301 (grades 1–9)	596 (grades 7–9)	484 (grades 7–9)
Student surveys in two measurement points, <i>n</i> (%)				
T1 (4-5/2011)	43 (94)	38 (88)	172 (93)	132 (80)
T2 (4-5/2013)	49 (74)	31 (94)	169 (89)	124 (86)
Staff survey (1-2/2012), <i>n</i> (%)	24 (46)	12 (46)	22 (41)	16 (39)

enjoy being together', 'Working in teams goes well in my class', 'Classmates interrupt if some pupil is being bullied', 'Classmates help each other in school tasks', 'Classmates help each other in problem situations', 'It's easy to get along with schoolmates', 'I have friends at this school', and 'Schoolmates accept me as I am.' Students responded on a five-point Likert scale (0 = totally agree; 1 = agree; 2 = neither agree nor disagree; 3 = disagree; 4 = totally disagree). The scale has been verified to fit the School Well-Being Model. The internal reliability (Cronbach's α) of the social relationship subscale has been reported to be good ($\alpha = 0.89$ in lower secondary schools) [27]. In the current study, the items in this measure were averaged, and the internal reliability (Cronbach's α) for the scale was high ($\alpha = 0.85$).

Relatedness to school was measured with a five-item subscale from the Need for Relatedness Scale [30], which is based on the self-determination theory [31]. The stem for the school context is, 'In this school, I feel . . .', followed by items of feeling 'supported', 'listened to', 'understood', 'valued' and 'safe'. Students responded on a five-point Likert scale (0 = totally agree; 1 = agree; 2 = neither agree nor disagree; 3 = disagree; 4 = totally disagree). In the current study, the items in this measure were averaged, and the internal reliability (Cronbach's α) for this scale was high ($\alpha = 0.92$).

School climate was measured with a question modified from the home climate question in HBSC surveys [32] by replacing the word 'home' with 'school'. Students answered the following question: 'How do you experience the climate in your school?'

Students responded to the questions on a five-point scale (0 = very good; 1 = fairly good; 2 = not good or poor; 3 = fairly poor; 4 = very poor).

All the measures of school-related social factors were reverse coded before the analyses; higher scores thus indicated positive measures.

Data on the school processes

The qualitative data from the local contact people, school staff and principals provided information about the different PA promotion school processes. *Local contact people* had a special interest in school-based PA promotion and they were nominated locally to be the points of contact for the national programme's administration. Local contact people completed an online survey (1/2012) ($n = 6$), and two researchers from the research centre conducted recorded, theme-based telephone interviews with four of the local contact people to obtain a general evaluation of the school project, its progress, success and challenges. (5/2012). The open-ended interview questions are presented in Table II. The *school staff* survey ($n = 83$) was a single online survey given to the teachers of each school after a year and a half in the programme (1–2/2012). Teachers were asked to identify, describe and evaluate possible changes in the school actions, staff and student opinions. The statements used in the survey are shown in Table III. Schools A and B were schools with both primary and lower secondary school students, and only answers from lower secondary school teachers were included in this study. *School principals* ($n = 4$) were invited to by the researchers to complete an e-mail survey (5/2013) comprising open-ended

Table II. *The open questions of the telephone interview conducted with the local contact persons in 5/2012*

What are your opinions on the effects of the project so far from the point of view of

- students?
- teachers and staff?
- school community and school culture?
- network and co-operators?

Have the teachers in your school attended the updating training provided by the University of Jyväskylä?

Other comments?

Table III. *Statements from the school staff online survey in 1-2/2012*

I believe there will be lasting changes in our school from the project.^a (lasting changes)

Increasing physical activity during the school day increases satisfaction with school.^a (increase satisfaction with school)

Students' physically active recess contributes to a peaceful learning environment.^a (peaceful environment)

I have participated in the implementation of the project.^b (participation)

The project is discussed among the teachers.^c (discussion among teachers)

The project is clearly visible in the operations of our school.^c (project visible at school)

Note: Abbreviations of the statements in Fig. 1 are presented after each statement in brackets. PA = physical activity. PE = physical education.

^aTotally disagree/disagree/not agree or disagree/agree/totally agree.

^bYes/no/I don't know.

^cTotally agree/agree/not agree or disagree/disagree/totally disagree.

questions concerning the school process, its continuity and staff engagement (Table IV). Responses were obtained from Schools B, C and D. All qualitative data were transcribed into written data with Microsoft Word and separated into school cases (altogether 12 pages).

Analyses

Means and standard deviations from the student-level data were calculated for continuous variables for males and females in each school. Student's *t* test was used to investigate the differences in PA at recess and school-related social factors between genders at T1. Two-way ANOVA was used to analyse the differences among eighth-graders at T1 and T2 in PA at recess and school-related social factors by gender, year (T1 – T2) and gender*year interaction. Two-way ANOVA was calculated separately for each school. The statistical analyses were performed using IBM SPSS Statistics version 20, and the level of significance was set at 0.05.

There were differences between the study schools in their levels of PA at recess at first measurement

and the selected PA promotion actions. Therefore, a researcher panel from the study group analysed and presented case descriptions for each school project. First, all student-level and school process data were organised under separate school cases. Second, researcher triangulation was conducted by two researchers (H.L.H. and M.H.H.) separately, independently analysing and producing case descriptions of each school. Due to the many types of qualitative data gathered, the analysis combined characteristics from classification, narrative approach and content analysis [33]. The researcher panel with a third researcher (K.L.) then compared the findings and case descriptions, discussed the possible differences and agreed on the final version of the results.

Ethics statement

The study protocol and consent procedure were approved by the Ethics Committee of the University of Jyväskylä, and all measurements were carried out in accordance with the Declaration of Helsinki [34].

Table IV. *The questions of the principal survey via e-mail in 5/2013*

How did the Schools on the Move realise in the everyday work in your school in autumn 2012?
Estimate whether the activities have remained the same, decreased or increased compared to spring 2012?
What barriers have you encountered in carrying on with the Schools on the Move activities in your school?
What factors have supported the Schools on the Move activities to become even better in your school?
How has the school staff participated in the Schools on the Move activities in autumn 2012?
What means have you used to make the school staff participate?
Have the Schools on the Move activities spread to other schools in your municipality?
Other comments?

Results

In the study schools, school-related social factors were already at relatively high levels in the first measurement. Males reported a better school climate ($P=0.030$) than females in School C, and females reported better relatedness to school ($P=0.003$) than males in School D (Table V). No other gender differences in PA at recess or school-related social factors were found.

School A

There were no differences in students' PA at recess or school-related social factors between the two time-points in School A (Table VI). Based on the staff survey, the common awareness of the project was high as the project was seen as highly visible and was discussed among the teachers (Fig. 1a). The staff reported that PA during the school day increased satisfaction with school and that physically active recess contributed to a peaceful learning environment (Fig. 1a).

The local contact person reported that the project had offered teachers new tools for their work, and their commitment and attitudes were positive in this school. The promotion of school day PA had been a whole-school matter and school strategy and the initial resistance seen among some of the teachers in the beginning had eased off.

'Physical activity is not just the job of the physical education teacher, but all teachers have the possibility to create physically active operations alongside with their teaching—this kind of thinking has clearly increased'.

- Local contact person from School A

This attitude was supported by the staff survey in which the belief in lasting changes revealed to be high (Fig. 1a). Based on the interviews with the local contact people, the municipality had also supported the school initiatives and the idea had spread to other schools in the municipality. Furthermore, parents had provided generally positive feedback about the programme. However, the local contact people mentioned that operations had been somewhat vulnerable due to the strong role of the project worker, the absence of a key teacher and the lack of time to plan and discuss the initiatives.

School B

No differences in PA at recess or school-related social measures were observed between the two time-points (Table VI), although the school staff mostly agreed on the benefits of PA during the school day on satisfaction with school and a peaceful learning environment (Fig. 1b). According to the local contact person, opportunities and conditions for PA had improved and, in accordance with one of the project goals, which was to take student opinion into account, students had also taken responsibility for implementing recess activities. It was furthermore felt that the structures for PA had become more sustainable.

The project was discussed and visible in the school, and teachers' awareness of it increased during the follow-up (Fig. 1b). Despite this, most teachers had not participated in the implementation of the activities (33% agreed and totally agreed), and only 60% of staff believed in lasting changes would result from the project (Fig. 1b).

Table V. Descriptive statistics of the student measures at time-point 1 (T1) in spring 2011 and time-point 2 (T2) in spring 2013

	T1 (spring 2011)					T2 (spring 2013)						
	Males		Females		Total	P for gender	Males		Females		Total	
	N	Mean (SD)	N	Mean (SD)	N		Mean (SD)	N	Mean (SD)	N	Mean (SD)	
A	20		23		43		26		23		49	
PA at recess	20	1.1 (0.4)	23	1.0 (0.2)	43	1.0 (0.3) 0.200	26	1.3 (0.6)	23	1.0 (0.5)	49	1.1 (0.6)
Peer relationship at school	20	2.8 (0.4)	22	2.7 (0.8)	42	2.8 (0.6) 0.529	26	2.4 (1.1)	23	2.6 (0.9)	49	2.5 (1.0)
Relatedness to school	20	2.8 (0.6)	23	2.4 (0.9)	43	2.6 (0.8) 0.069	23	2.8 (0.9)	23	2.6 (1.2)	46	2.7 (1.0)
School climate	20	2.8 (0.6)	23	2.6 (0.8)	43	2.7 (0.7) 0.383	22	2.7 (0.8)	23	2.8 (0.9)	45	2.8 (0.8)
B	11		27		38		19		12		31	
PA at recess	11	1.4 (0.5)	27	1.0 (0.3)	38	1.1 (0.4) 0.069	19	1.1 (0.5)	12	1.0 (0.4)	31	1.1 (0.4)
Peer relationship at school	11	2.6 (0.7)	27	2.9 (0.7)	38	2.8 (0.7) 0.358	19	2.7 (1.1)	12	2.5 (0.7)	31	2.6 (1.0)
Relatedness to school	11	2.7 (0.6)	27	2.8 (0.6)	38	2.7 (0.6) 0.729	19	2.6 (1.4)	12	2.8 (0.7)	31	2.7 (1.2)
School climate	11	3.0 (0.6)	27	2.6 (0.6)	38	2.7 (0.7) 0.059	17	2.6 (1.2)	12	2.6 (0.7)	29	2.6 (1.0)
C	95		77		172		78		91		169	
PA at recess	94	1.1 (0.5)	77	1.0 (0.3)	171	1.1 (0.4) 0.103	77	1.4 (0.6)	91	1.0 (0.3)	168	1.2 (0.5)
Peer relationship at school	94	2.8 (0.6)	77	2.8 (0.5)	171	2.8 (0.6) 0.436	78	2.8 (0.7)	91	2.8 (0.6)	169	2.8 (0.7)
Relatedness to school	92	2.8 (0.7)	77	2.8 (0.7)	169	2.8 (0.7) 0.504	75	2.8 (0.8)	89	2.8 (0.8)	164	2.8 (0.8)
School climate	92	2.9 (0.7)	77	2.7 (0.7)	169	2.8 (0.7) 0.030	76	2.9 (0.8)	90	2.7 (0.6)	166	2.8 (0.7)
D	74		58		132		64		60		124	
PA at recess	74	0.9 (0.5)	58	0.9 (0.3)	132	0.9 (0.4) 0.685	64	1.3 (0.5)	60	0.9 (0.3)	124	1.1 (0.4)
Peer relationship at school	70	2.6 (0.9)	58	2.8 (0.7)	128	2.7 (0.8) 0.181	64	2.5 (0.9)	60	2.4 (0.6)	124	2.5 (0.7)
Relatedness to school	71	2.5 (1.0)	58	3.0 (0.7)	129	2.7 (0.9) 0.003	62	2.7 (0.9)	59	2.6 (0.8)	121	2.7 (0.8)
School climate	71	2.8 (1.0)	58	3.0 (0.6)	129	2.9 (0.8) 0.141	64	2.5 (1.0)	59	2.5 (0.8)	123	2.5 (0.9)

Note: SD = standard deviation. PA = physical activity. Statistically significant values presented in bold ($P < 0.05$).

‘Finnish Schools on the Move has been visible as a matter all the time, even too much according to some teachers. Teachers are aware of what it’s about, but they haven’t become eager to join in the actual activities’.

- Local contact person from School B

The principal also mentioned school transportation schedules for students from a longer distance as a hindering factor in extending recess time. According to the local contact person, the ideology of a more physically active school day had spread to other school levels in the municipality, such as upper secondary school.

School C

Male students reported higher levels of PA at recess in spring 2013 compared to spring 2011 while no differences were observed in females (P for

interaction = 0.004) (Table VI). According to the local contact person, the encouragement of female students and the least active students to be physically active was seen as a particular challenge. The principal mentioned that the parking policy had been changed and all possible facilities had been drawn on PA purposes. However, the local contact person noted how there were too few facilities for physical activities due to the renovation of the school building.

No differences in school-related social factors were observed between the two time-points (Table VI). According to the local contact person, the empowerment of students was one of the key factors in the project, with students participating and taking responsibility for the planning and implementation of the project. Teachers’ attitudes towards the project had also become more positive during the project and the principal concluded that

Table VI. The results of two-way ANOVA for the differences between eighth-graders in time-point 1 (spring 2011) and time-point 2 (spring 2013)

	School A		School B		School C		School D	
	<i>F</i>	<i>P</i>	<i>F</i>	<i>P</i>	<i>F</i>	<i>P</i>	<i>F</i>	<i>P</i>
PA at recess	<i>F</i> (1, 88)		<i>F</i> (1, 65)		<i>F</i> (1, 335)		<i>F</i> (1, 252)	
Model	2.553	0.061	1.902	0.138	12.973	<0.001	1.960	<0.001
Gender	5.545	0.021	4.066	0.048	25.592	<0.001	2.291	<0.001
Year	0.763	0.385	1.902	0.173	7.078	0.008	1.997	0.001
Gender x Year	0.763	0.385	1.068	0.305	8.565	0.004	1.581	0.003
Peer relationships at school	<i>F</i> (1, 87)		<i>F</i> (1, 65)		<i>F</i> (1, 336)		<i>F</i> (1, 248)	
Model	0.966	0.413	0.723	0.542	0.176	0.913	2.031	0.110
Gender	0.047	0.829	0.000	0.998	0.314	0.576	0.512	0.475
Year	1.892	0.172	0.749	0.390	0.004	0.950	4.475	0.035
Gender x Year	0.867	0.354	1.115	0.295	0.197	0.658	1.470	0.226
Relatedness at school	<i>F</i> (1, 85)		<i>F</i> (1, 65)		<i>F</i> (1, 329)		<i>F</i> (1, 246)	
Model	1.226	0.305	0.207	0.891	0.128	0.943	3.015	0.031
Gender	3.112	0.081	0.373	0.543	0.214	0.644	2.801	0.095
Year	0.307	0.581	0.049	0.825	0.011	0.917	0.401	0.527
Gender x Year	0.222	0.639	0.086	0.771	0.162	0.688	5.841	0.016
School climate	<i>F</i> (1, 84)		<i>F</i> (1, 63)		<i>F</i> (1, 331)		<i>F</i> (1, 248)	
Model	0.264	0.851	0.830	0.482	2.341	0.073	4.306	0.006
Gender	0.161	0.689	1.453	0.233	6.548	0.011	0.293	0.589
Year	0.089	0.766	0.595	0.443	0.045	0.832	11.393	0.001
Gender x Year	0.529	0.469	0.815	0.370	0.260	0.610	1.894	0.170

Note: PA = physical activity. Gender was coded as 1 = male, 2 = female. Statistically significant values presented in bold ($P < 0.05$).

school spirit had improved and that providing students with more meaningful things to do outside lessons had resulted in less bullying and misbehaviour. School staff also agreed with the statements that increased PA has positive effects on students' satisfaction with school and physically active recess contributes to a more peaceful learning environment (Fig. 1c).

'There's a saying: If you don't provide youth with sensible things to do, they will come up with senseless things to do themselves'.

- Principal from School C

The staff also believed the project would lead to lasting changes in their school (Fig. 1c). According to the principal, subject teachers other than physical education staff had been initially somewhat sceptical about the increased attention paid to PA promotion compared to their own areas of interest. However, organizing club activities during recess in other areas than PA as well had changed their feelings

more positive. The principal also mentioned that teachers no longer perceived the supervision of recess times as laborious, and the teachers participated in the recess activities alongside with the students. This improved teacher-student relationships, and thereby, it promoted some teachers' participation and engagement in the promotion actions. The project was discussed among the teachers and was visible in the school, but the number of teachers involved in the implementation was still relatively low (Fig. 1c). The local contact person concluded that co-operation with the municipality and its officials had begun, and the well-being of children and youth had been identified as a common theme and topic for discussion.

School D

Male students reported higher levels of PA at recess in spring 2013 compared to spring 2011 whereas there were no differences for female students (P for interaction = 0.003) (Table VI). The school culture had become more physically active, and

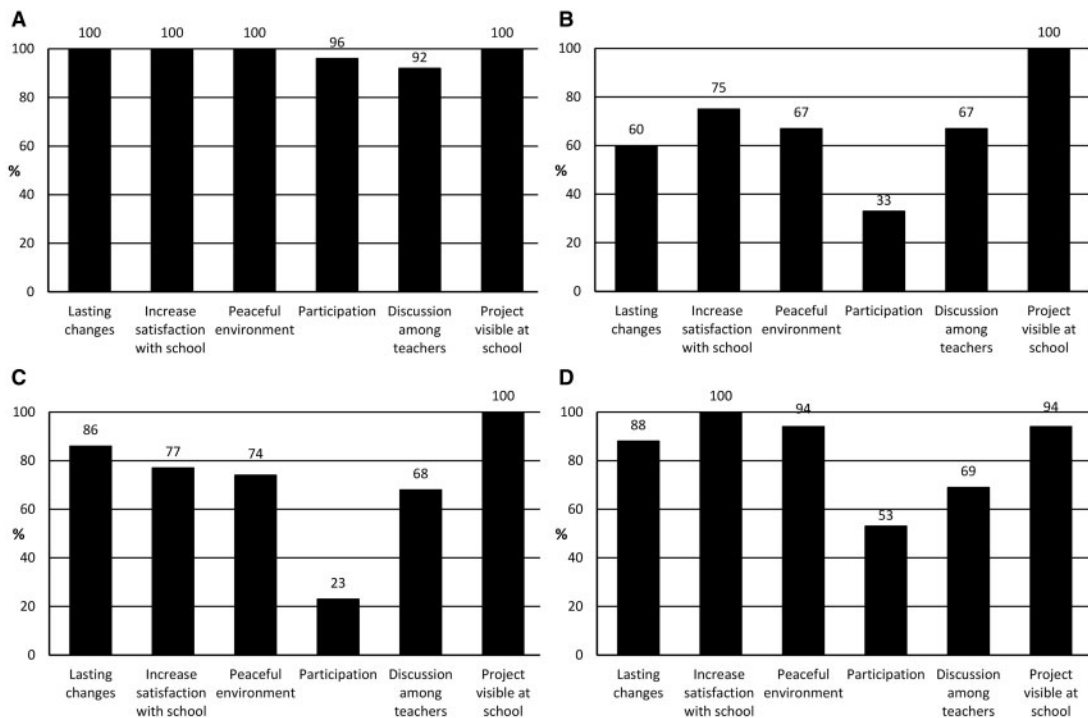


Fig. 1. Proportions of those staff members who agree and totally agree in the school staff survey in Schools A–D.

according to the principal, school staff's own PA, motivation and understanding of the importance of PA had increased their engagement. The local contact person mentioned that PA was perceived more as a theme of school well-being rather than it just being related to a particular school subject, namely physical education and concluded that positive changes had been seen in classroom discipline due to increased PA.

'Attitudes towards the promotion of well-being have improved; before this was perceived as sports and physical education. Now, the promotion of students' well-being is a matter of the whole school and every adult in the school'.

- Local contact person from School D

School staff were also very positive about the project, and they reported belief in lasting changes and agreed with the positive effects of PA during the school day on school satisfaction and a peaceful

learning environment (Fig. 1d). However, both female and male students reported lower levels of peer relationships at school and school climate in spring 2013 compared to spring 2011 (Table VI).

The students were included in the planning and implementation of the activities, and the school facilities for PA were developed by the local contact person. The local contact person highlighted that encouraging female students to be more physically active was a challenge and that the activities offered had not reached the least active students. The principal had similarly encountered challenges. For example, inadequate commitment of the municipality, which led to the school being solely responsible for the project, and relatively limited participation by teachers, with only half being involved (Fig. 1d).

Summary of the school cases

Based on the qualitative findings from the study schools, it is evident that school principals had a significant role in PA promotion in all of the study

schools. In addition, staff knowledge and awareness of the project were high in each school, and PA promotion had increasingly become a whole-school matter, even after initial resistance by some staff members. School-based PA had also begun to be perceived more as promotion of overall well-being among the staff rather than it just be seen to be relevant to sport and physical education. From a social perspective, improvements in student–teacher relationships were highlighted, and recognition of the importance of supportive school climate to empower students in the planning and implementation of the PA promotion was shared across the study schools. Community engagement had been initiated and improved and the need for support from the municipality was identified as an issue for further development. The study schools had also shared the idea of school-based PA promotion to other schools in the municipality.

Discussion

This study investigated the differences in PA at recess and school-related social factors by gender among eighth-grade students during and after the pilot phase of the Finnish Schools on the Move programme in 2011 and 2013 in four lower secondary schools. The aim was also to describe the school PA promotion processes and staff experiences. Higher levels of recess PA were observed in male students in two schools in spring 2013 compared to spring 2011. Most school-related social factors did not differ between 2011 and 2013. However, the school cultures and routes towards a more physically active school day differed among the schools. The project was highly visible in all schools, but staff participation varied from almost all teachers in one school to half or less in other schools. Most staff agreed that increased PA during the school day enhanced satisfaction with school and helped to create a peaceful learning environment, and in three out of four schools a high proportion of staff believe there would be lasting changes from the project.

A physically active school culture supports students' opportunities for school-based PA [35, 36],

and thus, it could enhance students' levels of PA in the school environment [36]. One reason for the observed positive differences only in male students' PA at recess could be that the implemented strategies were more desirable to males than females, both from the physical and social perspectives, e.g. the provision of ball games during recess. This might have led to males' physical dominance in the space at recess and provided fewer opportunities for female students to make use of the activities [37]. Recess time has a highly social function especially for female students [38]; indeed a recent study with fourth-graders reported that females requested smaller 'cosy' areas with equipment such as swings and climbing walls to hang out, and that they moved in smaller groups during recess instead of just sitting [38]. The provision of gender-specific facilities and activities during recess times could be one solution for encouraging more female students to be more physically active [15] and might more adequately satisfy their need to socialize during this time [38]. In addition, the provision of sufficient space and equipment for PA could promote female students' lighter PA and enjoyment in PA [39]. Altogether, the first steps towards a more physically active school culture are usually actions within the school environment, awareness, attitudes and opportunities for PA. Therefore, it could take several years of promotion for the changes in the school culture's physical, social and institutional levels to actualize into PA itself, especially in females.

Participation in PA, especially during recess, has been positively related to social factors in young people [18, 40], and as noted earlier, one of the goals of the Finnish Schools on the Move programme is a more pleasant school day [15]. Based on the results of this study, it seems that positive changes in social factors do not occur as a by-product of PA participation or its promotion. The study schools did not take social factors into consideration when planning the activities which is seen important in the promotion of both positive social development and PA levels [41, 42]. One solution to achieve positive social changes could be through high staff participation and engagement in promotion activities; these could improve teacher-student

relationships and perceived staff support for both PA and the school climate, possibly leading to better school engagement [43, 44] and higher school connectedness [45] in adolescents.

The examination of school cases is essential in a programme with high school individuality, and pooling the schools together could have concealed interesting observations from the individual schools. Based on the qualitative analysis, similarities were observed between the school cases, such as the ownership of the process, a supportive school climate and leadership. In all school cases, the ownership of the process was seen as an important factor in the project's success and PA promotion being a whole-school matter was mentioned in several cases. If a school project is developed within the school itself and not externally, staff is more likely to be involved and the project becomes part of the school culture [46]. Empowering students and staff to create opportunities for PA can build a sense of control over the process and lead to a more inclusive school culture [46]. Based on the interviews and surveys, all schools in this study promoted student empowerment in their strategies including students as peer instructors and as planners and implementers. For Schools A and C, long-lasting teacher engagements made it possible for the students to have space and involvement in the project. In addition, the positive role of the principal was recognised by the study schools and seen as crucial in providing a supportive school climate [47] and leadership [48] for the project's implementation.

The results of this study showed that staff participation varied across the schools. This may be due to the differing stages of development schools were at in terms of fostering a physically active culture, with PA promotion being carried out in different manners and intensities. This is in line with the findings that higher readiness of school staff to promote PA among youth at school has been associated with higher levels of students' PA at recess [49]. In the present study, some schools had only one person responsible for PA promotion, whilst other schools had a number of staff members or even a nominated team for planning and implementing school-based PA promotion. Therefore, shared responsibility for

PA promotion in school could be another important factor in ensuring continuity. Previous research also shows that staff knowledge on the benefits of PA might not translate into action during the school day or could be contradictory to their actions' impact to students' PA behaviour [50]. The importance of staff participation for the successful planning and implementation of the promotion process should be acknowledged, and finding solutions to increase staff participation and knowledge on youth PA promotion is imperative.

In general, there can be great variation in the pedagogical practices of schools in Finnish basic education. Schools have the flexibility to create their own school curricula with local emphases based on the national curriculum for basic education, and they can also plan their own projects to make the school day more physically active [30]. Accordingly, the Finnish Schools on the Move programme provides schools with great autonomy and flexibility in their PA promotion processes [15]. However, for schools in this study this did not seem to materialize in practice with them failing to realize their potential for PA promotion. Effectively increasing students' PA levels might require more individualized support and analysis based on schools' strengths and weaknesses. In addition, more information about 'best practices' and support to implement plans based on a pre-analysis may enhance effectiveness. These approaches might enable the schools to maximize the opportunities and potential for PA promotion at individual (e.g. attitudes, readiness for change), social (student and staff participation, emotionally and physically safe and inspiring settings, teaching methods), environmental (school facilities and equipment) and policy (curricular approaches, co-operation in different networks) levels, as suggested by the social-ecological model [22]. Careful examination of the whole-school approach in the schools could also reveal opportunities for before-, during and after-school activities [23, 24]. For example, most schools failed to consider the potential of classroom time as a strategy to for increasing PA and decreasing sedentary time during school hours.

The strengths of this study include the mixed method approach using both quantitative and qualitative data. Three different qualitative sources of data provided more in-depth knowledge on the school processes employed to create more physically active school days, and staff experiences were investigated with multiple data sources. The examination of student-level data with two cohorts of eighth-grade students enabled students' perceptions to be compared during and one year after the programme's pilot phase. Nevertheless, some limitations should be recognized when interpreting the findings. Voluntary participation in the programme and the school selection criteria might have influenced the results. In addition, self-report measures, especially of PA, can result in measurement errors and social desirability bias [51, 52]. However, the correlations between the self-reported recess PA and objectively measured school day PA data were moderate. A wider variety of different types of PA during recess should also be investigated in student surveys. The numbers of students in Schools A and B were relatively low, which might have affected the interpretation of the student-level results and been insufficient to produce statistically significant interactions in the ANOVA analysis. For example, the graphs of differences in PA at recess in both Schools A and B had similar directions as in Schools C and D, but gender*year interaction was not statistically significant. Furthermore, students were not interviewed, and the perceptions of the effects and changes in the project were limited to those of adults. In addition, the response rate in the staff survey was less than 50% in all schools and completion may have been by staff members who were more interested in the matter, thereby leading to more positive results. One school principal was also not reached after several attempts, and this might have affected the case description of this school.

In conclusion, attempts to promote PA in the school environment enhanced male students' PA participation at recess but were not sufficient per se in enhancing school-related social factors. The careful consideration and planning of activities, e.g. during recess, could promote both positive relationships and PA at school. Therefore, future research should investigate what types of activities

are effective in increasing both PA and social well-being in schools. In addition, more information is needed on the sufficient levels of school autonomy and autonomy's connection to effective promotion strategies as well as the role of staff engagement and participation in the promotion of a more physically active and pleasant school day.

Acknowledgements

The authors wish to thank the members of study group in the LIKES Research Centre for Physical Activity and Health for their participation in the data collection, and especially Katja Rajala for her participation in the interview process.

H.L.H., M.H.H., K.L. and T.H.T participated in the planning phase and conceived the overall study. H.L.H participated in data collection; H.L.H., M.H.H., K.K., L.L., T.L. and T.H.T. conceptualized the manuscript; H.H. and H.L.H. participated in the data management, and H.H. analysed the quantitative data and H.L.H., M.H.H. and K.L. analysed the qualitative data. All authors have participated in drafting or revising the manuscript, and all have approved the manuscript as submitted.

Funding

This work was supported by the Ministry of Education and Culture [grant number 121/626/2012 to H.L.H.]; the Juho Vainio Foundation [grant number 201210127 to H.L.H.]; and the Sports Institute Foundation [grant number 20160277 to H.L.H.] and the University of Jyväskylä [to H.L.H.].

Conflict of interest statement

None declared.

References

1. Janssen I, Leblanc AG. Systematic review of the health benefits of physical activity and fitness in school-aged children and youth. *Int J Behav Nutr Phys Act* 2010;7:40.
2. Singh A, Uijtendwilligen L, Twisk JWR *et al.* Physical activity and performance at school: a systematic review of the

- literature including a methodological quality assessment. *Arch Pediatr Adolesc Med* 2012; **166**:49–55.
3. Biddle SJH, Asare M. Physical activity and mental health in children and adolescents: a review of reviews. *Br J Sports Med* 2011; **45**:886–95.
 4. Inchley J, Currie D, Young T *et al.* *Growing up Unequal: Gender and Socioeconomic Differences in Young People's Health and Well-Being. Health Behaviour in School-Aged Children (HBSC) Study: International Report from the 2013/2014 Survey.* Copenhagen: WHO Regional Office for Europe, 2016.
 5. Brodersen NH, Steptoe A, Boniface DR *et al.* Trends in physical activity and sedentary behaviour in adolescence: ethnic and socioeconomic differences. *Br J Sports Med* 2007; **41**:140–4.
 6. Corder K, Sharp SJ, Atkin AJ *et al.* Change in objectively measured physical activity during the transition to adolescence. *Br J Sports Med* 2015; **49**:730–6.
 7. Marks J, Barnett LM, Strugnell C *et al.* Changing from primary to secondary school highlights opportunities for school environment interventions aiming to increase physical activity and reduce sedentary behaviour: a longitudinal cohort study. *Int J Behav Nutr Phys Act* 2015; **12**:59.
 8. Dobbins M, Husson H, DeCorby K *et al.* School-based physical activity programs for promoting physical activity and fitness in children and adolescents aged 6 to 18. *Cochrane Database Syst Rev* 2013; **2**:CD007651.
 9. Naylor P-J, McKay HA. Prevention in the first place: schools a setting for action on physical inactivity. *Br J Sports Med* 2009; **43**:10–3.
 10. Beighle A, Morgan CF, Le Masurier G *et al.* Children's physical activity during recess and outside of school. *J Sch Heal* 2006; **76**:516–521.
 11. Jago R, Baranowski T. Non-curricular approaches for increasing physical activity in youth: a review. *Prev Med* 2004; **39**:157–63.
 12. Ridgers ND, Stratton G, Fairclough SJ. Physical activity levels of children during school playtime. *Sports Med* 2006; **36**:359–71.
 13. Ridgers ND, Timperio A, Crawford D *et al.* Five-year changes in school recess and lunchtime and the contribution to children's daily physical activity. *Br J Sports Med* 2012; **46**:741–6.
 14. Langford R, Bonell C, Jones H *et al.* Obesity prevention and the Health promoting Schools framework: essential components and barriers to success. *Int J Behav Nutr Phys Act* 2015; **12**:15.
 15. Haapala HL, Hirvensalo MH, Laine K *et al.* Adolescents' physical activity at recess and actions to promote a physically active school day in four Finnish schools. *Health Educ Res* 2014; **29**:840–52.
 16. Ridgers ND, Timperio A, Crawford D *et al.* What factors are associated with adolescents' school break time physical activity and sedentary time?. *PLoS One* 2013; **8**:e56838.
 17. Ridgers ND, Salmon J, Parrish A-M *et al.* Physical activity during school recess: a systematic review. *Am J Prev Med* 2012; **43**:320–8.
 18. Haapala HL, Hirvensalo MH, Laine K *et al.* Recess physical activity and school-related social factors in Finnish primary and lower secondary schools: cross-sectional associations. *BMC Public Health* 2014; **14**:1114.
 19. Jia Y, Way N, Ling G *et al.* The influence of student perceptions of school climate on socioemotional and academic adjustment: a comparison of chinese and american adolescents. *Child Dev* 2009; **80**:1514–30.
 20. Wang M, Degol JL. School climate: a review of the construct, measurement, and impact on student outcomes. *Educ Psychol Rev* 2016; **28**:315–52.
 21. Joyce HD, Early TJ. The impact of school connectedness and teacher support on depressive symptoms in adolescents: a multilevel analysis. *Child Youth Serv Rev* 2014; **39**:101–7.
 22. Sallis JF, Cervero RB, Ascher W *et al.* An ecological approach to creating active living communities. *Annu Rev Public Health* 2006; **27**:297–322.
 23. Institute of Medicine. *Educating the Student Body: Taking Physical Activity and Physical Education to School.* Washington, DC: The National Academies Press, 2013.
 24. Centers for Disease Control and Prevention. *Comprehensive School Physical Activity Programs: A Guide for Schools.* Atlanta, GA: U.S. Department of Health and Human Services, 2013.
 25. McMullen J, Ní Chróinín D, Tammelin T *et al.* International approaches to whole-of-school physical activity promotion. *Quest* 2015; **67**:384–99.
 26. Morton KL, Atkin AJ, Corder K *et al.* The school environment and adolescent physical activity and sedentary behaviour: a mixed-studies systematic review. *Obes Rev* 2016; **17**:142–58.
 27. Konu AI, Koivisto AM. The school well-being profile - a valid instrument for evaluation. In: *Proceedings in EDULEARN11 Conference: 4-7 July 2011, Barcelona.* Barcelona: IATED, 2011, 1842–50.
 28. Konu A, Rimpelä M. Well-being in schools: a conceptual model. *Health Promot Int* 2002; **17**:79–87.
 29. Lintonen T, Konu AI. The Well-being Profile - an internet tool for school health promotion. *Promot Educ* 2006; **13**:230–5.
 30. Richer FS, Vallerand RJ. Construction et validation de l'échelle du sentiment d'appartenance sociale (ÉSAS). *Rev Eur Psychol Appl* 1998; **48**:129–38.
 31. Deci EL, Ryan RM. The "What" and "Why" of Goal Pursuits: Human Needs and the Self-Determination of Behavior. *Psychol Inq* 2000; **11**:227–68.
 32. Currie C, Roberts C, Morgan A *et al.* *Young People's Health in Context. Health Behaviour in School-Aged Children (HBSC) Study: International Report from the 2001/2002 Survey.* Copenhagen: WHO Regional Office Europe, 2004.
 33. Schreier M. Qualitative Content Analysis. In: Flick U (ed). *The SAGE Handbook of Qualitative Data Analysis.* London: SAGE Publications Ltd, 2014, 170–84.
 34. World Medical Association/World Medical Association Declaration of Helsinki: ethical principles for medical research involving human subjects. *Jama* 2013; **310**:2191–4.
 35. Rickwood G. School culture and physical activity: a systematic review. *Can J Educ Adm Policy* 2013; **143**.
 36. Morton KL, Corder K, Suhrcke M *et al.* School policies, programmes and facilities, and objectively measured sedentary time, LPA and MVPA: associations in secondary school and over the transition from primary to secondary school. *Int J Behav Nutr Phys Act* 2016; **13**:54.
 37. Blatchford P, Baines E, Pellegrini A. The social context of school playground games: sex and ethnic differences, and

- changes over time after entry to junior school. *Br J Dev Psychol* 2003; **21**:481–505.
38. Pawlowski CS, Tjørnhøj-Thomsen T, Schipperijn J *et al.* Barriers for recess physical activity: a gender specific qualitative focus group exploration. *BMC Public Health* 2014; **14**:639.
 39. Biddle S, Whitehead SH, O'Donovan TM *et al.* Correlates of participation in physical activity for adolescent girls: a systematic review of recent literature. *J Phys Act Health* 2005; **2**:423–34.
 40. Bailey R. Physical education and sport in schools: a review of benefits and outcomes. *J Sch Health* 2006; **76**:397–401.
 41. McNamara L, Colley P, Franklin N. School recess, social connectedness and health: a Canadian perspective. *Health Promot Int* 2015; **32**:1–11.
 42. Lintunen T, Gould D. Developing social and emotional skills. In: Papaioannou A, Hackfort D (eds). *Fundamental Concepts in Sport and Exercise Psychology*. London: Routledge, 2013, 619–33.
 43. Haapasalo I, Välimaa R, Kannas L. How Comprehensive school students perceive their psychosocial school environment. *Scand J Educ Res* 2010; **54**:133–50.
 44. Quin D. Longitudinal and contextual associations between teacher-student relationships and student engagement: a systematic review. *Rev Educ Res* 2017; **87**:345–87.
 45. Whitlock JL. Youth perceptions of life at school: contextual correlates of school connectedness in adolescence. *Appl Dev Sci* 2006; **10**:13–29.
 46. Inchley J, Muldoon J, Currie C. Becoming a health promoting school: evaluating the process of effective implementation in Scotland. *Health Promot Int* 2007; **22**:65–71.
 47. Naylor P-J, Nettlefold L, Race D *et al.* Implementation of school based physical activity interventions: a systematic review. *Prev Med* 2015; **72**:95–115.
 48. Marks R, Samdal O, Rowling L. Theoretical and empirical base for implementation components of health-promoting schools. *Health Educ* 2011; **111**:367–90.
 49. Ehlers DK, Huberty JL, Beseler CL. Is school community readiness related to physical activity before and after the Ready for Recess intervention?. *Health Educ Res* 2013; **28**:192–204.
 50. Huberty J, Dinkel D, Coleman J *et al.* The role of schools in children's physical activity participation: staff perceptions. *Health Educ Res* 2012; **27**:986–295.
 51. Sallis JF, Saelens BE. Assessment of physical activity by self-report: status, limitations, and future directions. *Res Q Exerc Sport* 2000; **71**:1–14.
 52. Shephard RJ. Limits to the measurement of habitual physical activity by questionnaires. *Br J Sports Med* 2003; **37**:197–206.